New Acquisition Initiatives and Implementation for Systems Engineering

20 April 2010

Director, Mission Assurance

Systems Engineering

Office of the Secretary of Defense

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Department of Defense

Soldiers, Sailors, Airmen, Marines

- We are a nation at war
- Over 1.3 million active duty men and women
- Over 684,000 civilians
- Over 1.1 million Guard & Reserves

DoD Mission:

- Provide the military forces needed to deter war
- Protect the security of our country

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Key DoD Themes

1. Take care of our people
2. Rebalancing the Military
3. Reforming what and how we buy
4. Supporting our troops in the field

Secretary of Defense
HASC Budget Rollout Brief
February 2010

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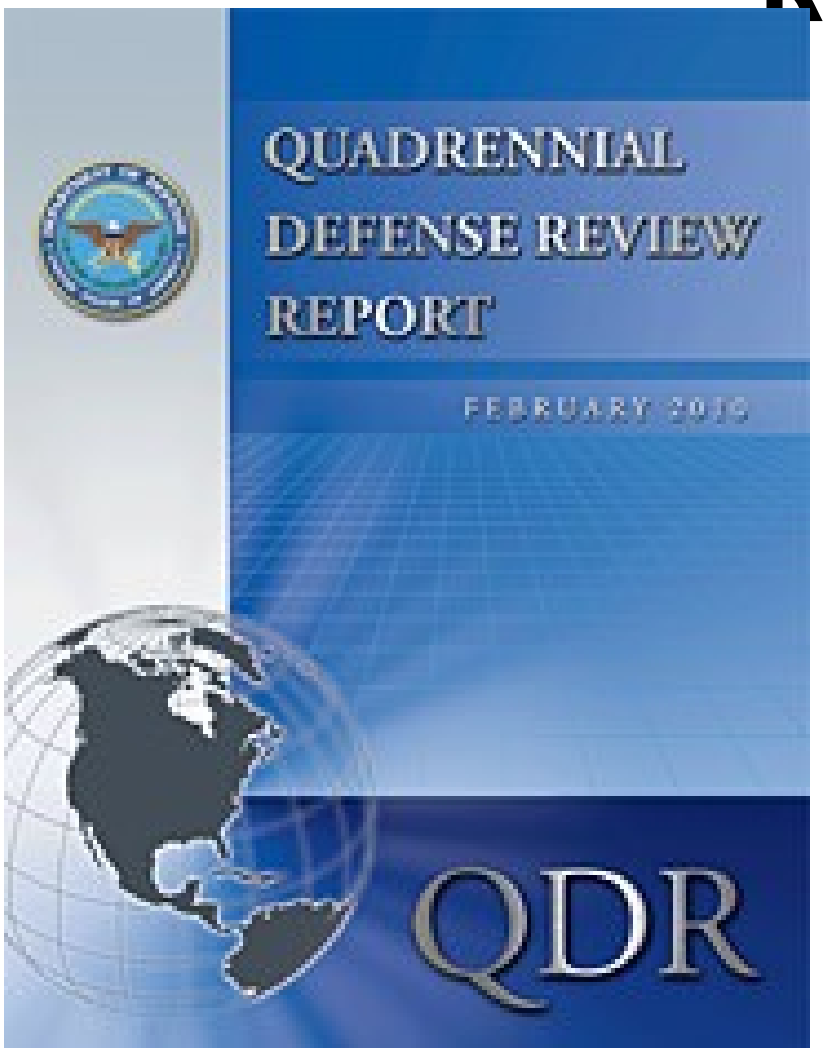
Rebalance the Force
2010 Quadrennial Defense Review



1. **Defend the United States and Support Civil Authorities at Home**
2. **Succeed in Counterinsurgency, Stability, and Counterterrorism Operations**
3. **Build the Security Capacity of Partner States**
4. **Deter and Defeat Aggression in Anti-Access Environments**
5. **Prevent Proliferation and Counter Weapons of Mass Destruction**

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Our Guidance

- **Quadrennial Defense Review Executive Summary, February 2010**
  - ***Further rebalance the capabilities of America's Armed Forces to prevail in today's wars, while building the capabilities needed to deal with future threats***
  - ***Further reform the Department's institutions and processes to better support the current needs of the warfighter; buy weapons that are usable, affordable and truly needed; and ensure that taxpayer dollars are spent wisely and responsibly***
  - ***Preserve and enhance the All-Volunteer Force***
  - ***Improve how it matches requirements with mature technologies, maintains disciplined systems engineering approaches, institutionalizes rapid acquisition capabilities, and implements more comprehensive testing***
- **Quadrennial Defense Review Report Preface**
  Secretary of Defense Robert M. Gates, February 2010
  - ***United States needs a broad portfolio of military capabilities with maximum versatility across the widest possible spectrum of conflict***

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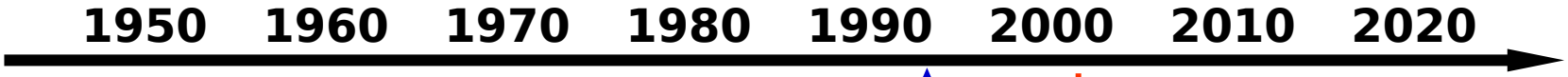
Perspective for the Next Decade



Cold War

Vietnam War

Desert Storm

Bosnia

Collapse of Soviet Union

Kosovo

OIF

OEF

National Security Challenges

Irregular/Hybrid Warfare

Defense Capabilities

ICBM

Satellite comms

C4ISR

Stealth

Precision Strike

UAV

Robotics

LGB's

GPS

Nuclear propulsion

Night Vision

Human Terrain
Ubiquitous Observation
Contextual Exploitation
Scaleable Action

Enabling Technologies

Transistor

Composite Materials

MEMS

Superconductors

Solid state laser

Space tracking

Web protocols

VHSIC

MIMIC

Digital computing

IR Sensors

High Performance Computing

- Advanced Electronics, Photonics Algorithms, MEMS
- Nano; Meta; & New Materials
- Cognitive Computing
- Bio-Revolution

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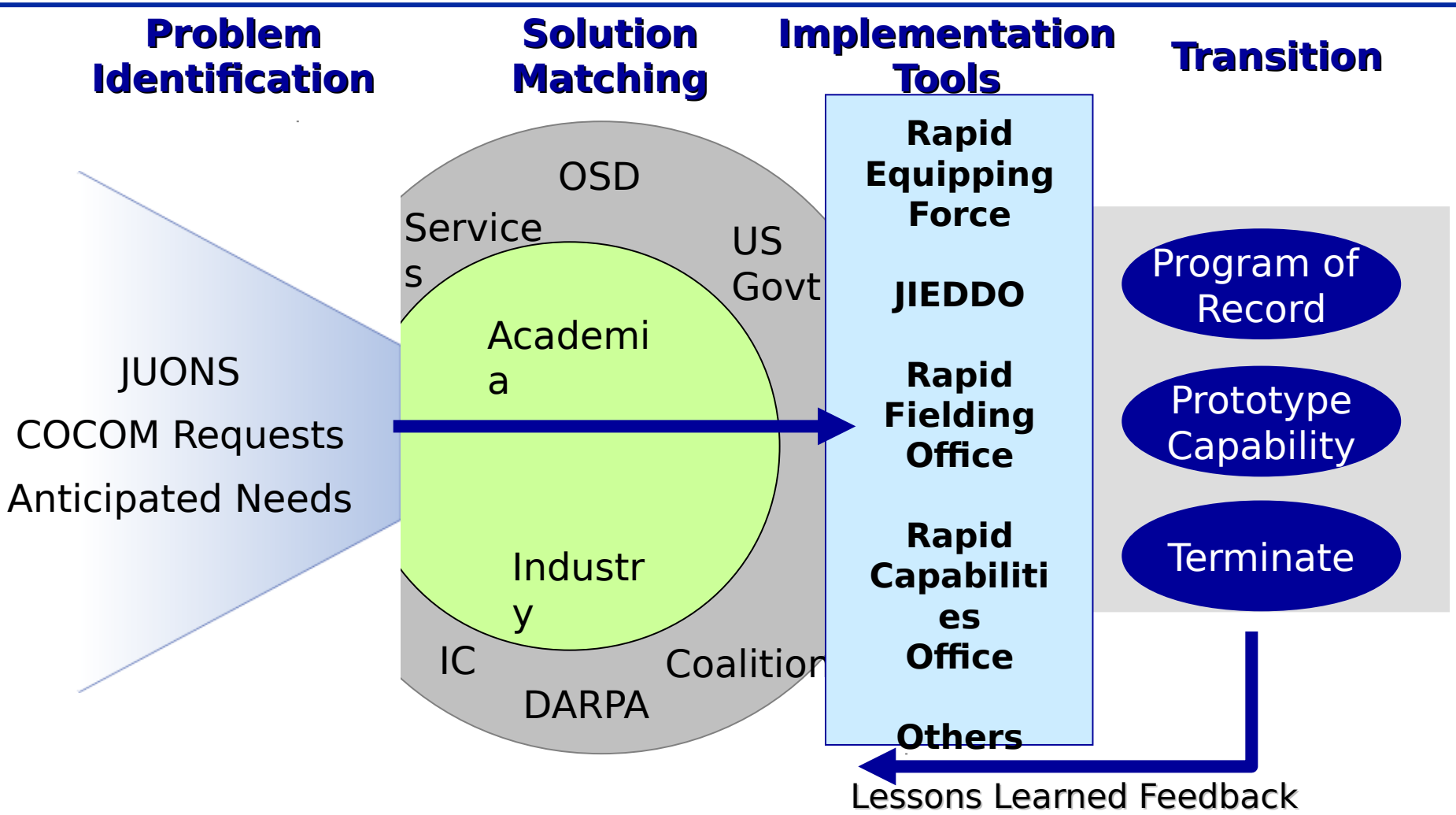
The Challenge of Rapid Fielding



Role of Systems Engineering in Rapid Fielding?

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Support for Change

Weapon Systems Acquisition Reform Act of 2009 (Public Law 111-23)

- **Establishes *Director, Systems Engineering* as principal systems engineering advisor to the SECDEF and the USD(AT&L)**
- **Requires Congressional reporting on Systems Engineering Capabilities and MDAP achievement of measurable performance criteria**
- **WSARA signed into law 22 May 2009**
- **Director, Systems Engineering on board 21 Sep 2009**
- **Implementing DTM signed by USD(AT&L) 4 Dec 2009; Acquisition Guidance on-line 31 Jan 2010**
- **DoD Directive formalizing responsibilities of Director, Systems Engineering in development**
- **First annual WSARA SE / DT&E Joint Report delivered to Congress 31 Mar 2010**

President Barack Obama hands a pen to U.S. Rep. Robert Andrews (D-NJ) as he signs the Weapons Systems Acquisition Reform Act in the Rose Garden at the White House Friday, May 22, 2009. Standing from left are: Andrews, Rep. John McHugh (R-NY), Sen. Carl Levin (D-MI), Rep. Ike Skelton (D-MO) and Rep. Mike Conaway (R-TX). Official White House Photo by Samantha Appleton

MDAP- Major Defense Acquisition Program (USC 2430)

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Systems Engineering Mission

- **We execute substantive technical engagement throughout the acquisition life cycle with major and selected acquisition efforts across DoD**
- **We apply best engineering practices to:**
  - **Help program managers identify and mitigate risks**
  - **Shape technical planning and management**
  - **Support and advocate for DoD Component initiatives**
  - **Provide technical insight to OSD stakeholders**
  - **Identify systemic issues for resolution above the program level**
  - **Support Knowledge Based Decision Making**

We are the "E" in DDR&E

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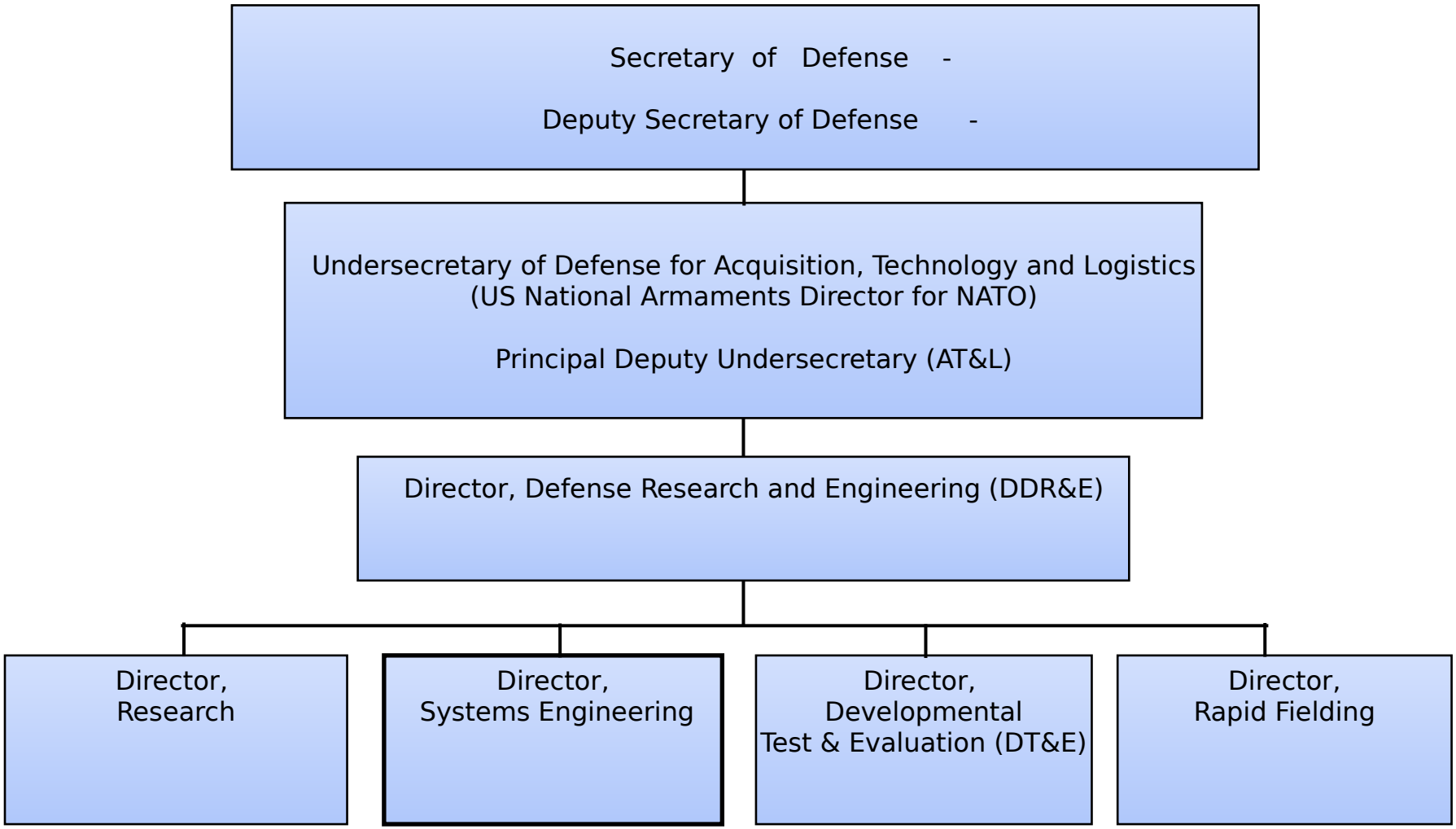
US Department of Defense Organization


Secretary of Defense -
Deputy Secretary of Defense -
Undersecretary of Defense for Acquisition, Technology and Logistics
(US National Armaments Director for NATO)
Principal Deputy Undersecretary (AT&L)
Director, Defense Research and Engineering (DDR&E)
Director, Research
Director, Systems Engineering
Director, Developmental Test & Evaluation (DT&E)
Director, Rapid Fielding

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Director, Systems Engineering

Director, Systems Engineering

Principal Deputy

Systems Analysis

Addressing Emerging Challenges on the Frontiers of Systems Engineering

- Analysis of Complex Systems/Systems of Systems
- Development Planning/Early SE
- Program Protection/Acquisition Cyber Security
- University and Industrial Engineering Research

Major Program Support

Supporting USD(AT&L) Decisions with Independent Engineering Expertise

- Engineering Assessment / Mentoring of Major Defense Programs
- Program Support Reviews
- OIPT / DAB / ITAB Support
- Systems Engineering Plans
- Systemic Root Cause Analysis

Mission Assurance

Leading Systems Engineering Practice in DoD and Industry

- Systems Engineering Policy, Guidance, and Standards
- Specialty Engineering (System Safety, Reliability / Availability / Maintainability, Quality, Manufacturing, Producibility, Human Systems Integration (HSI))

Providing technical support and systems engineering leadership and oversight to USD(AT&L) in support of planned and ongoing acquisition programs

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Systems Engineering Contributions to Acquisition

- Systems-level technical leadership
- Risk identification and management
- Interface management
- Life cycle focus
- Robust exploration of the need
- Achievable system design
- Integration of technical disciplines

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SE Research Needs

- **Flexible system design**
  - Agile systems/products/architectures
  - Flexible systems engineering processes and methods
  - Capture agility, adaptability, responsiveness as design attributes
- **Education and Workforce accelerants: at individual, corporate and national levels**
- **Early systems engineering and development planning**
  - Melding of ops requirements with early systems engineering to highlight promising technical solutions: the “art of the possible”
- **Engineering System of Systems**
  - Addressing the challenge of complexity

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Challenges Ahead

- **Create the tools to enable Rapid Capability Delivery**
  - Shorten the time to deliver life-saving and war-winning technologies – without compromising SE integrity
- **Expand the aperture of SE to address 21st century technical challenges**
  - Security, software-intensive, etc…
- **Embrace complexity**
  - Systems of Systems / Complex Adaptive Systems / Emergent behaviors
- **Expand the SE human capital resource base**
  - Reflect new insights in curricula to grow the next “crop” of SE

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Opportunities

- **Acquisition reform efforts have recognized criticality of strong Systems Engineering focus for program success**
  - ***Systems Engineering toolkit focused on identifying and managing risk – development risk, production risk and life-cycle***
- **Growing focus on addressing "early-acquisition" phases - requirements definition, development planning, and early acquisition systems engineering support**
  - ***Leading to more informed decisions at MS B***
- **Our development processes need to evolve to provide faster product cycles, more adaptable products and address emerging challenges**
- **Future US Defense capabilities depend on a capable US engineering workforce in and out of government**
  - ***Need to create opportunities to grow future "Engineering Heroes"***

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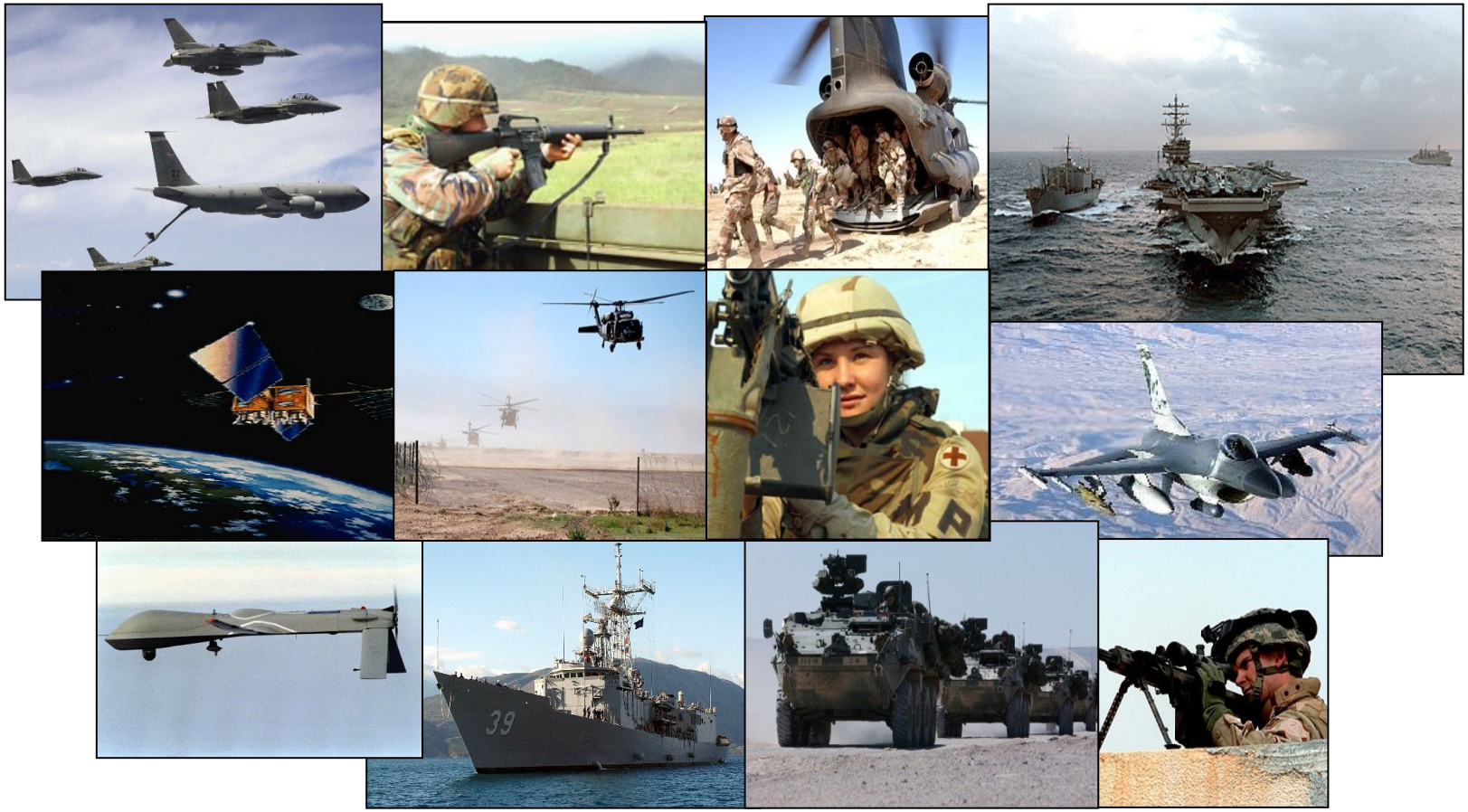
Systems Engineering: Critical to Program Success



Innovation, Speed and Agility

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